DOCUMENT RESUME

ED 129 930 TM 005 813

AUTHOR Koo, Helen P.; Burkheimer, Graham J., Jr.
TITLE A National Study of the Upward Bound Program: Methodological and Design Considerations.
INSTITUTION Research Triangle Inst., Durham, N.C.
PUB DATE [Apr 76]
NOTE 22p.; Paper presented at the Annual Meeting of the American Educational Research Association (60th, San Francisco, California, April 19-23, 1976); For related documents, see ED 121 994, ED 121 995, TM 005 233 and TM 005 802

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Academic Achievement; College Admission; Comparative Analysis; *Compensatory Education Programs; Dropout Rate; *High School Students; Low Income Groups; Measurement Techniques; *National Programs; Post Secondary Education; Program Effectiveness; *Program Evaluation; *Research Design; *Research Methodology; School Holding Power; Secondary Education; Student Motivation
IDENTIFIERS *Upward Bound

ABSTRACT

This paper concerns a national evaluation study of the Upward Bound (UB) Program conducted for the U.S. Office of Education by the Research Triangle Institute. It describes the practical constraints imposed on the study design and the features of the design that were shaped by these constraints. The design features include the quasi-experimental and cross-sectional approaches. Also considered are methodological problems presented by the design and measures taken to alleviate them, including a synthetic cohort approach and the choice of the comparison group. (Author/RC)

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A National Study of the Upward Bound Program: Methodological and Design Considerations

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

by

Helen P. Koo
Graham J. Burkheimer, Jr.

Research Triangle Institute

Paper Presented at the
1976 Annual Meeting of the American
Educational Research Association,
Session No. 29.02
San Francisco, California
23 April 1976

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ABSTRACT

A National Study of the Upward Bound Program:
Methodological and Design Considerations[1/]

HELEN P. KOO and GRAHAM J. BURKHEIMER
Research Triangle Institute

This paper is the second in a series of four papers concerning a national evaluation study of the Upward Bound (UB) Program conducted for the U.S. Office of Education by the Research Triangle Institute.[2/] It describes the practical constraints imposed on the study design and the features of the design that were shaped by these constraints. The design features include the quasi-experimental and cross-sectional approaches. Also considered are methodological problems presented by the design and measures taken to alleviate them, including a synthetic cohort approach and the choice of the comparison group.

1/ Paper presented at the 1976 Annual Meeting of the American Educational Research Association, San Francisco, California, 23 April 1976.

2/ Burkheimer, G. J., Levinsohn, J. R., Koo, H. P., and French, A. M. Evaluation Study of the Upward Bound Program (Volume IV of A Study of the National Upward Bound and Talent Search Programs. Four Volumes). Research Triangle Park, N.C.: Center for Educational Research and Evaluation, Research Triangle Institute, April 1976.

A National Study of the Upward Bound Program:
Methodological and Design Considerations

INTRODUCTION

This paper, the second in a series of four,[1] examines some major methodological considerations of the Upward Bound (UB) study, the general design and objectives of which have been presented in the first paper. Topics treated in this paper include the constraints surrounding the study design and the features of the design adopted in response to them as well as the methodological problems presented by these features and the measures taken to alleviate them.[2]

In planning the UB study, one of the first steps was to develop a conceptual overview of the UB processes (or treatments) and consequences, as well as other relevant factors to be considered in an evaluation study. Figure 1 depicts in sequence[3] UB and related processes and outcomes. Page 1 of Figure 1 shows the procedures and conditions required for creating UB projects, including funding and staffing. Once projects have begun operations, they select students and offer a number of activities constituting the program (page 2 of Figure 1). These activities or treatments are intended to produce certain effects (page 3 of Figure 1), which are separated into those occurring during UB participation ("immediate effects"), those taking place in the few years after UB participation ("intermediate

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1/ The other papers in the series (AERA Discussion No. D-19, 1976 Annual AERA Meeting, April 19-23, 1976, San Francisco, California) are:

Pyecha, J. N. and Berls, R. Background, Objectives, and Design of the National Study of the Upward Bound Study.

Bergsten, J. Sample Design and Data Collection Procedures: National Study of the Upward Bound Program.

Burkheimer, G. J., Levinsohn, J. R., and French, A. M. A National Study of the Upward Bound Program: Analysis, Major Findings, and Implications.

2/ A more complete presentation of the methodology and design of the study is given in: Burkheimer, G. J., Levinsohn, J. R., Koo, H. P., and French, A. M. Evaluation Study of the Upward Bound Program (Volume IV of A Study of the National Upward Bound and Talent Search Programs. Four Volumes). Research Triangle Park, N.C.: Research Triangle Institute, April 1976.

3/ Figure 1 is presented on three separate pages; the sequential nature of the processes and outcomes is represented from left to right on a given page.

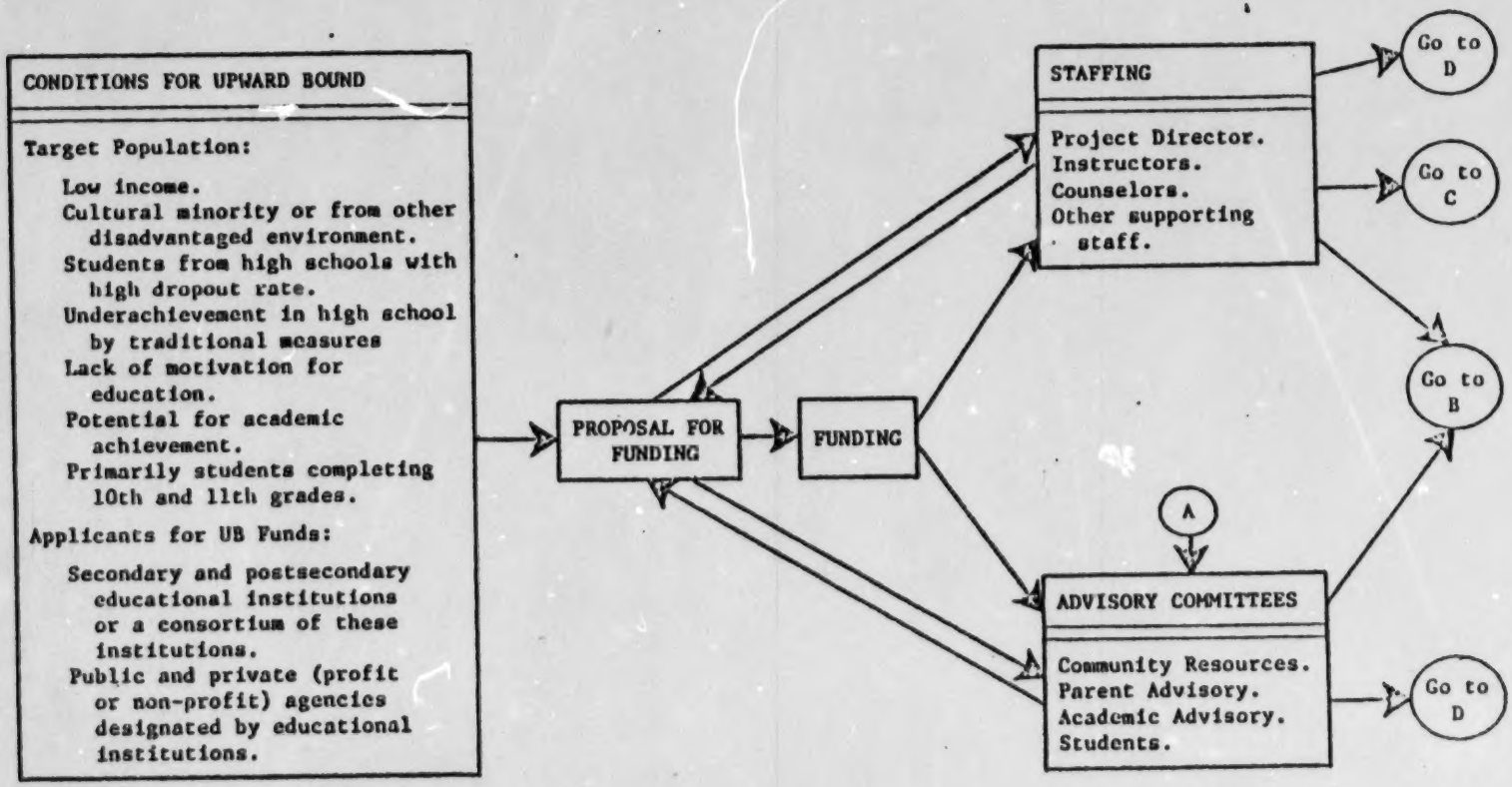


Figure 1. A Conceptual Model of Upward Bound.

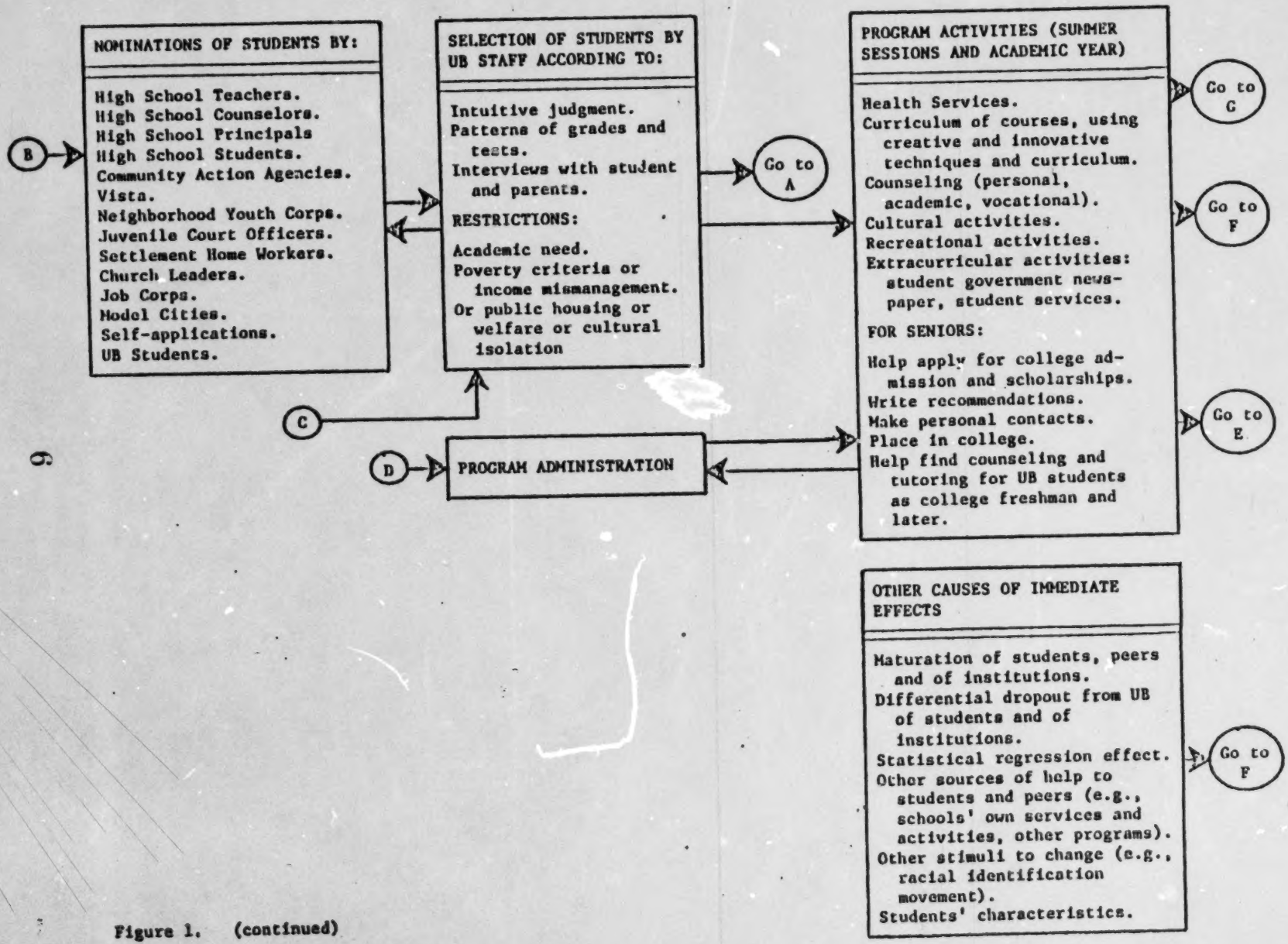

NOMINATIONS OF STUDENTS BY:
High School Teachers.
High School Counselors.
High School Principals
High School Students.
Community Action Agencies.
Vista.
Neighborhood Youth Corps.
Juvenile Court Officers.
Settlement Home Workers.
Church Leaders.
Job Corps.
Model Cities.
Self-applications.
UB Students.
B
SELECTION OF STUDENTS BY UB STAFF ACCORDING TO:
Intuitive judgment.
Patterns of grades and tests.
Interviews with student and parents.
RESTRICTIONS:
Academic need.
Poverty criteria or income mismanagement.
Or public housing or welfare or cultural isolation
Go to A
C
D
PROGRAM ADMINISTRATION
PROGRAM ACTIVITIES (SUMMER SESSIONS AND ACADEMIC YEAR)
Health Services.
Curriculum of courses, using creative and innovative techniques and curriculum.
Counseling (personal, academic, vocational).
Cultural activities.
Recreational activities.
Extracurricular activities: student government newspaper, student services.
FOR SENIORS:
Help apply for college admission and scholarships.
Write recommendations.
Make personal contacts.
Place in college.
Help find counseling and tutoring for UB students as college freshman and later.
Go to C
Go to F
Go to E
OTHER CAUSES OF IMMEDIATE EFFECTS
Maturation of students, peers and of institutions.
Differential dropout from UB of students and of institutions.
Statistical regression effect.
Other sources of help to students and peers (e.g., schools' own services and activities, other programs).
Other stimuli to change (e.g., racial identification movement).
Students' characteristics.
Go to F

Figure 1. (continued)

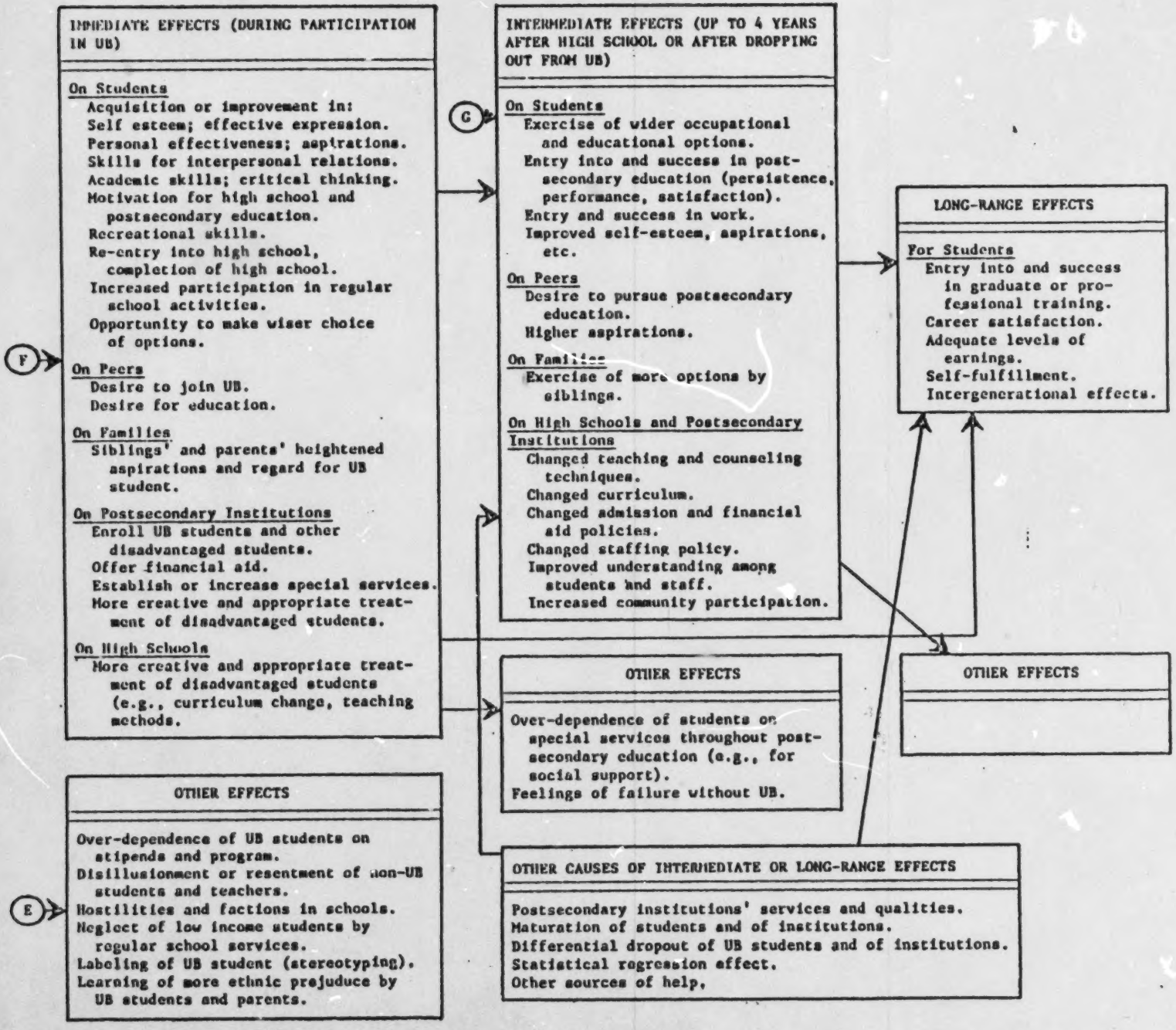

IMMEDIATE EFFECTS (DURING PARTICIPATION IN UB)
On Students
Acquisition or improvement in:
Self esteem; effective expression.
Personal effectiveness; aspirations.
Skills for interpersonal relations.
Academic skills; critical thinking.
Motivation for high school and postsecondary education.
Recreational skills.
Re-entry into high school, completion of high school.
Increased participation in regular school activities.
Opportunity to make wiser choice of options.
On Peers
Desire to join UB.
Desire for education.
On Families
Siblings' and parents' heightened aspirations and regard for UB student.
On Postsecondary Institutions
Enroll UB students and other disadvantaged students.
Offer financial aid.
Establish or increase special services.
More creative and appropriate treatment of disadvantaged students.
On High Schools
More creative and appropriate treatment of disadvantaged students (e.g., curriculum change, teaching methods.
F
G
INTERMEDIATE EFFECTS (UP TO 4 YEARS AFTER HIGH SCHOOL OR AFTER DROPPING OUT FROM UB)
On Students
Exercise of wider occupational and educational options.
Entry into and success in post-secondary education (persistence, performance, satisfaction).
Entry and success in work.
Improved self-esteem, aspirations, etc.
On Peers
Desire to pursue postsecondary education.
Higher aspirations.
On Families
Exercise of more options by siblings.
On High Schools and Postsecondary Institutions
Changed teaching and counseling techniques.
Changed curriculum.
Changed admission and financial aid policies.
Changed staffing policy.
Improved understanding among students and staff.
Increased community participation.
LONG-RANGE EFFECTS
For Students
Entry into and success in graduate or professional training.
Career satisfaction.
Adequate levels of earnings.
Self-fulfillment.
Intergenerational effects.
OTHER EFFECTS
Over-dependence of students on special services throughout post-secondary education (e.g., for social support).
Feelings of failure without UB.
OTHER EFFECTS
OTHER EFFECTS
Over-dependence of UB students on stipends and program.
Disillusionment or resentment of non-UB students and teachers.
Hostilities and factions in schools.
Neglect of low income students by regular school services.
Labeling of UB student (stereotyping).
Learning of more ethnic prejuduce by UB students and parents.
E
OTHER CAUSES OF INTERMEDIATE OR LONG-RANGE EFFECTS
Postsecondary institutions' services and qualities.
Maturation of students and of institutions.
Differential dropout of UB students and of institutions.
Statistical regression effect.
Other sources of help.

Figure 1. (continued)

effects"), and in the longer run ("long-range effects"). These intended effects, at each stage, may apply to the UB students, their peers, or the secondary and postsecondary institutions involved with the UB projects. Besides these intended effects, the UB projects may also bring about unintended results, some of which may be undesirable. These effects may occur at different time periods (the series of "other effects", page 3 of Figure 1). Finally, both the intended and unintended effects within each time period may be actually produced or moderated by factors other than UB, labelled "other causes" (pages 2 and 3 of Figure 1).

The specific processes or treatments through which the program may produce the intended (or unintended) effects are not presented, since early in the study it was found impossible to do this for the UB program as a whole. The UB program does not consist of a small number of identifiable treatment techniques with specific expected outcomes. Rather, in some general and unspecified manner the courses and tutoring offered by UB are expected to increase academic skills primarily, self-concept and other personal strengths secondarily. Similarly, the individual attention, counseling, and cultural and social activities afforded by the program are intended to strengthen self-esteem and related personal qualities, and thereby to increase academic interest and ability to learn. For this reason, Figure 1 simply documents the variety of activities and their intended outcomes found across the range of UB projects.

The various UB projects differ quite widely in their approach or program treatment. They provide different courses, using different classroom and tutoring techniques over varying periods of time; they employ different counseling techniques; and they place varying degrees of emphasis on the teaching of academic subjects and skills, the nurturing of the individual's ego, and the broadening of cultural and social experiences. In part, the diversity of treatments reflects the different types of students selected by different projects (some choosing students with very poor academic preparation and motivation, others selecting better prepared and more highly motivated students). And, in part, the diversity reflects the differing philosophies of various project directors and other UB personnel regarding compensatory education.

Due to time and budget limitations, not all aspects of the UB program (as depicted in Figure 1) could be investigated. It was determined that three major objectives of the program would be evaluated: (1) to increase the high school retention rates of participants; (2) to increase the rate of entry into postsecondary institutions of participants; and (3) to generate in participants the skills and motivation necessary for success in education beyond high school. Therefore, the study was limited to some of the "immediate effects" of Figure 1; specifically, to the impact of UB on its participants.

DESIGN ELEMENTS

The major study objectives, along with several practical constraints, shaped the major elements of the study design. Some constraints on the study design were imposed by the nature of the UB program; others were common to any attempt to evaluate an on-going social action program which has been in operation for several years without a built-in mechanism for evaluation. Finally, there were time and budget limitations. The major design elements, and the constraints influencing their choice, are discussed below.

Quasi-Experimental Design

An experimental design, which would be ideal for determining whether UB was having an effect on its participants, was not possible for several practical reasons. UB projects were on-going operations already working with numerous students and families; it was not politically feasible to randomly assign students to either UB participation or a control group which would receive no such benefit. Furthermore, the study results were required by the U.S. Office of Education (USOE) too soon to allow observation of experimental groups for an adequate period of time. A natural design, in which groups receiving different types of UB treatments would be compared, was also infeasible, since different treatments given by different projects were neither systematic nor well defined. Furthermore, students served by different projects differed in many dimensions (expected to be related to outcome measures) because projects observed varying selection criteria.

It was concluded that the best alternative among remaining options was a quasi-experimental design, in which a sample of UB students and a sample of comparison students (CS) would be studied through a short period of time. A process comparison model was adopted to serve as the conceptual framework guiding this design and analysis. This model and the choice of an appropriate comparison group are discussed below.

Cross-Sectional Design

A longitudinal study that would observe UB and CS groups through high school and follow them through their scheduled date of completion of post-secondary education, could not be funded. Instead, a cross-sectional approach (with a short longitudinal segment) was chosen. In the selected design, samples of a cross-section of participating UB students and appropriate comparison students were administered questionnaires in the spring, 1974, to collect retrospective and current data. They were also contacted in fall, 1974, to determine whether they had progressed to the next grade in school. The adopted approach enabled the study to obtain results within the time requirements of USOE. At the same time, the study was designed so that it could be expanded in the future, with the same samples, into a limited longitudinal study.

Study Objectives

The program objective, "to generate the skills and motivation necessary for success in education beyond high school," was difficult to evaluate. It was not possible to define all the requisite "skills and motivation" nor to determine how some should be measured.[4/] The research team had considered administering a standardized reading test to obtain measures on a basic skill that is needed by persons of any ethnic background to acquire a postsecondary education. In addition, certain standardized aptitude and achievement tests that were less culture-bound were considered as methods of measuring some skills that are generally considered helpful in acquiring

4/ Neither the research literature, the study's Advisory Council, nor special consultants could satisfactorily resolve these issues.

postsecondary education. The study's Advisory Council[5/] strongly advised against these considerations, pointing out that the use of any kind of test would gravely jeopardize the cooperation of the UB students in the study and would cause some of the CS group to refuse to participate. Thus, the decision was made to exclude the administration of tests from the study. The study therefore relied on school records for providing school grades, course information, and test scores needed to determine changes that occurred over the years among the sample UB and comparison students.

Had a longitudinal study been conducted, the third objective could have been better evaluated, since one measure of whether this objective was being met would have been to determine whether (with other relevant factors controlled) UB students do in fact enter and complete postsecondary education at higher rates than an appropriate comparison group (although this technique would examine possession of "sufficient" rather than "necessary" skills and motivation). A further follow-up of the sample students for this purpose is possible.

Measurement Methods

Because of the prohibitive cost of interviewing and other more direct methods of measurement for large numbers of subjects, written questionnaires were chosen as the primary instruments of data collection. Furthermore, to determine changes in school grades and curricula that occurred over the years among the UB and comparison students, relevant information was obtained for each student from school records. This choice was made because, given the cross-sectional design, changes in school performance over the course of UB participation (and during comparable years for the CS group), could be measured only retrospectively. In addition to the probable adverse effects on the cooperation of UB and comparison students, the administration of tests of skills to measure changes over the short time period of data collection would be of questionable validity, as well as costly.

5/ The composition of the Advisory Council is explained in the first paper of the series.

METHODOLOGY

Within the constraints of a quasi-experimental, cross-sectional approach, a process model was devised to guide the further development of the study design. The model requires that the choice of the appropriate comparison students be carefully made. The cross-sectional aspect of the design presents certain problems; to help alleviate them, a synthetic cohort approach was adopted. The model, definition of comparison students, and synthetic cohort approach are discussed below.

Process Comparison Model

The models described here represent general models of processes. These models were used to indicate the types of data that were to be collected, to help identify the sources from which the collection should be made, and thereby to help specify the study design and guide the analysis.

Any proposed examination of the UB program implies a study of a process. A simple model of the essential features of a process is depicted in Figure 2. To analyze the process, data relating to the several aspects of this model need to be obtained:

1) Operational characteristics (i.e., the structure and functioning of the process).
2) Characteristics of input (i.e., the nature of the material on which the process operates).
3) Characteristics of output (i.e., the nature of the designated product of the process).
4) Characteristics of resources required for operation (i.e., the nature of that which is required to start the process and keep it in operation).
5) By-product characteristics (i.e., the nature of any nondesignated results of process operation--over and above the designated output).
6) Relationships between various aspects of the system (i.e., any changes to characteristics of input as reflected in the characteristics of output; benefits of the process as reflected in desirable transformation of input into output and in desirable by-products; cost effectiveness, etc.).

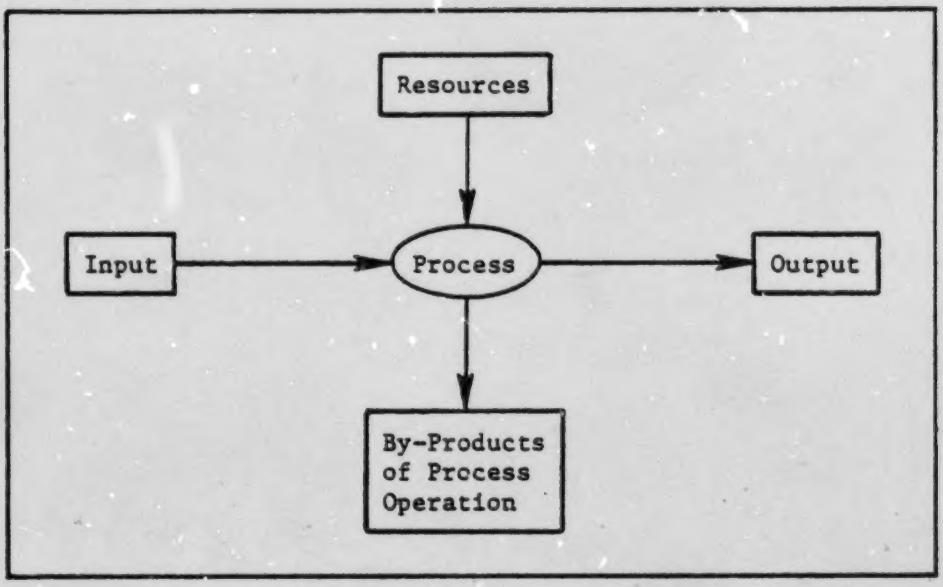


Figure 2. A Simple Process Model.

For many physical processes that take place over a short period of time, this type of examination is quite sufficient. For social processes (especially educational intervention processes such as UB), such examinations fall short in many respects, particularly in terms of definitively verifying the worth of the process. There are two major reasons for these shortcomings. First, these processes do not take place in a vacuum; rather, other processes operate on the input (students) over the same period as the process under study (UB program). Second, the processes are not stationary over time; that is, the process itself is modified by external and internal forces. For these reasons, any desirable transformation of input (students with certian educational characteristics) into output (students with increased retention rates and postsecondary entry rates), or any desirable by-products, could be attributable to other operating processes (other programs, including high schools) or to an interaction of the process under consideration with these external processes. As long as one is concerned only with descriptive characteristics of input, output, resources, by-products, and operation at one point in time, the simple process model may

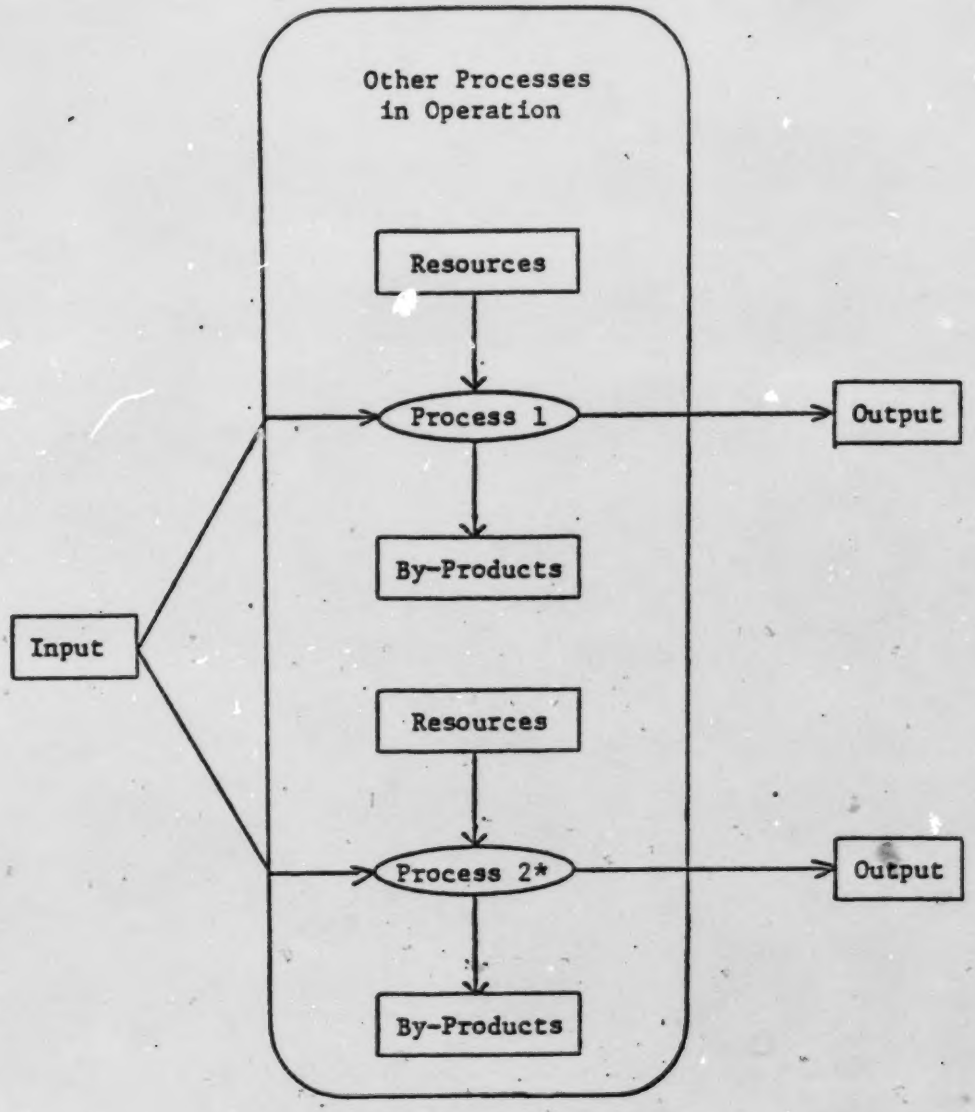
be appropriate even for social processes. However, in examining relationships among the system elements, particularly in assessing worth or value of the process, or in evaluating effects of process on input, the simple process model is insufficient.

To overcome these shortcomings in the evaluation of a process, the study adopted a process comparison model, which is depicted in Figure 3. Here one is concerned with a comparison of two (or more) processes operating within the same overall environment constituted by other ongoing processes.[6/] These two processes function within the context of other ongoing processes (such as the high school educational system, community, and other social programs). Using such a process comparison model, a statement regarding the relative value of the two processes could be made in terms of the relative desirability of the two outputs (e.g., UB and non-UB school retention rates), relative cost effectiveness, relative desirability of by-products, etc. Such statements, however, could be misleading if there were notable differences in input to the two processes due to some systematic selection mechanism. The validity of any statement regarding relative value based on differential output, by-products, or resources required, therefore assumes that (1) input to the two processes (i.e., UB and CS groups) under consideration is similar on relevant dimensions, and (2) all other relevant processes operate more or less equivalently on both sets of input. This is implicit in the depiction in Figure 3.

The first assumption concerning similar input requires that the comparison students be selected carefully, and that any systematic differences in the input characteristics between the UB group and the CS group need to be considered in analysis. The second assumption regarding the equivalence of other processes operating on both inputs (UB and CS groups) requires that information about these other processes be collected for both groups and accounted for in the analysis.[7/]

[6/] One of the processes may arbitrarily be considered as an absence of the other process. Thus, UB could be considered as one of the processes, and the absence of UB (operating upon non-participating comparison students) as the other process.

[7/] The sample design and statistical adjustments for differences are discussed in the third paper in this series.



* Process 2 may be conceptualized as no more than an absence of Process 1.

Figure 3. - A Simple Process Comparison Model.

The models presented are very simple ones compared to the UB program as it actually exists. The UB program is, in reality, but one of several interrelated processes of educational intervention, each of which is a subprocess of the larger network of educational and social development. Additionally, there are distinct, related subprocesses within the UB program and various feedback loops to adjust these subprocesses, as well as the main (UB) process, over time. The models were not, however, intended to depict precisely the intricate mechanisms of the UB program. Rather, the intent was to provide a conceptual framework for the study design and analysis. As such, the simple models were helpful in specifying the various classes of relevant variables to be measured and analyzed.

Comparison Students

In defining the comparison population, the goal was to identify a group as similar to the UB students as practicable, limiting differences to their non-participation in UB. Several factors had to be taken into account, including: (1) effects of schools on student outcomes; (2) peer effects or indirect effects of UB on non-participants attending the same schools as UB students; and (3) individual effects or the influence of personal characteristics on outcomes. To control for school effects, students attending the same schools as the UB students (termed "UB schools" for convenience) should be chosen as the CS group. To control for peer effects, students should be selected who attend schools which are similar to the UB schools but none of whose students participate in UB ("non-UB schools"). Finally, to control for individual effects, comparison students should be selected to be similar to UB students on personal characteristics related to outcomes. Meeting all three conditions would require selecting comparison students similar to UB students from the UB schools and from similar non-UB schools. The study of both comparison groups would also allow an examination of school effects and peer effects. The cost of using both groups, however, was prohibitive; therefore, it was decided to limit the study to one comparison group. The effects of different schools on retention and postsecondary entry rates and other outcomes (e.g., changes in grades, etc.) were judged to be more important than the peer effects.

Hence the CS group was defined as tenth, eleventh, and twelfth graders who had never participated in UB, who attended the same schools as the UB students, and who, as a group, possessed some of the key characteristics of UB students (such as ethnicity, low-income family, and "academic risk" status).[8/]

The choice of the CS group presented two major difficulties. First, to the extent that UB activity in a school has had a beneficial effect on students who have not directly participated in the UB program (i.e., has had a positive peer effect), the study results would be biased toward underestimating beneficial effects of the UB program. Second, the comparison students from the same schools could represent students who theoretically could have participated in UB but for some reason did not choose to or were not selected by UB. In this basic manner, they would differ from the UB sample. The indirect or peer effects of UB on non-UB fellow students were considered to be relatively small because in general only a few students from any one school participate in UB and usually the participation effects no basic changes in the treatment of low-income students by the schools. The selection bias was not eliminated, but to some extent it was controlled by examining characteristics of selected UB and comparison students, such as socioeconomic status, school grades and curriculum prior to UB participation. By statistically adjusting for such differences, bias introduced by the selection problem is reduced.[9/] The two difficulties were judged as relatively minor, however, when compared to the problems presented by alternative definitions of the CS group.

Synthetic Cohort Approach

Like most educational intervention programs, UB is a dynamic process which takes place over an extended period of time. The required data for analysis include baseline measures on input, measures of resources expended

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8/ The specific procedures used in selecting comparison students are described in the third paper of this series.

9/ Although selection occurs and hence introduces possible bias, usually an UB project is able to accept into the program only a small fraction of all students who apply or stand to benefit, leaving a large pool of students who are similar to the UB participants.

over time, measures of by-products over time, measures of process structure and function over time, measures of final output in terms of stated purposes of the UB process. Similar data are, of course, required from the CS group of non-participants to speak more definitively to the question of UB impact on the student. Such data may be collected either longitudinally or retrospectively. As previously explained, a cross-sectional design was chosen (including the collection of some retrospective and short-range longitudinal data).

The cross-sectional approach poses a problem in that it examines a long-term process at a more or less frozen point in time. Various UB participants at that point in time not only belong to different age cohorts, but also have experienced differing lengths of exposure to UB. An approximate solution to the problem implemented in the current study is to view the cross-section of tenth, eleventh, and twelfth graders in the UB and CS samples as a synthetic cohort. That is, the successive stages of processing by UB (and other processes) experienced by the cross-section of tenth, eleventh, and twelfth graders at the sampled point in time are assumed to represent the successive stages that would be observed if the tenth graders were followed through their remaining high school years and into postsecondary education.

The synthetic cohort approach also allows one to control to some extent for the selectivity or "survivor" bias inherent in a cross-sectional design. Some past studies evaluating the effectiveness of the UB program in sending participants into postsecondary education have examined whether UB participants in a specific senior class continue into postsecondary education at greater rates than do other poverty-level students in that same senior class. Such designs are weak because they do not control for the selectivity of the groups being compared. That is, they study comparison students who have remained in school ("survived") on their own in a school system through which the UB participants have been specifically assisted (i.e., to become seniors). Thus, these comparison students are basically different from the UB group even if the two groups were equal on other relevant factors (e.g., socioeconomic status, ethnicity, high school type).

The synthetic cohort approach to the analysis of the UB process allows one to partially control for this selectivity or "survivor" effect within the time constraints of the study period. The partial control permitted by the synthetic cohort approach is obtained by adopting a theoretical framework based on the transition of individuals through the various stages of the educational process. A simplified[10/] depiction of this transition from tenth grade entry to completion of postsecondary study is given in Table 1. Such an approach is Markovian in character (with implication of postsecondary graduation or dropout as absorbing states). The various transition probability values (p_i, i=1, 8) given in Table 1 represent conditional probabilities (relative frequencies) for transition to a subsequent stage, given attainment of a current stage.

The characterization of the p_i values as conditional probabilities allows the direct computation of the probability of the completion of the entire process. In a longitudinal study, this probability could be estimated directly from observing the students throughout the entire period. But in the case of a time-bound study such as the present one, which is limited to an observation period of less than a year, direct estimation is not possible. Using the individual p_i values estimated in a time-bound study, however, the probability of interest (proportion completing postsecondary education given tenth grade entry) could be estimated by the nature of the transition matrix. The probability of completion of postsecondary education given tenth grade entry is simply the product of p_1 through p_8. Different p_i values, of course, would have to be estimated from different student (grade level) cohorts, and assumptions must be made that the p_i values are relatively stable in time (and that the process is relatively stable) for the approach to be valid. That is, the assumption must be made that the transition probability (or dropout rate) for a given grade, e.g., eleventh grade, is the same over the time period that would be necessary for the longitudinal study of actual cohorts. To the extent that such an assumption is true, the time-bound study can answer critical questions

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[10/] The model presented is simplified in that it does not allow for atypical movement through the process (e.g., High School Equivalency programs, dropout and return, open door postsecondary institutions not requiring high school completion, etc.), but focuses on the typical progression.

Table 1

SIMPLIFIED TRANSITION MATRIX FOR PROGRESS THROUGH STAGES OF EDUCATION

Educational Stage n	Educational Stage n + 1								
	10th Grade Completion	11th Grade Entry	11th Grade Completion	12th Grade Entry	12th Grade Completion	Postsecondary Entry	First Year Postsecondary Completion	Postsecondary Graduation	Dropout
10th Grade Entry	p_1								$1-p_1$
10th Grade Completion		p_2							$1-p_2$
11th Grade Entry			p_3						$1-p_3$
11th Grade Completion				p_4					$1-p_4$
12th Grade Entry					p_5				$1-p_5$
12th Grade Completion						p_6			$1-p_6$
Postsecondary Entry[a]							p_7		$1-p_7$
First Year Postsecondary Completion[a]								p_8	$1-p_8$

[a] This transition probability could not be estimated within the current study design.

regarding a process which takes place over a considerably longer time than the period available for observation.[11/] The transition matrix model can be applied to both UB participants and non-participants, and can be easily modified to take into account entry into the UB program at various points of educational attainment.

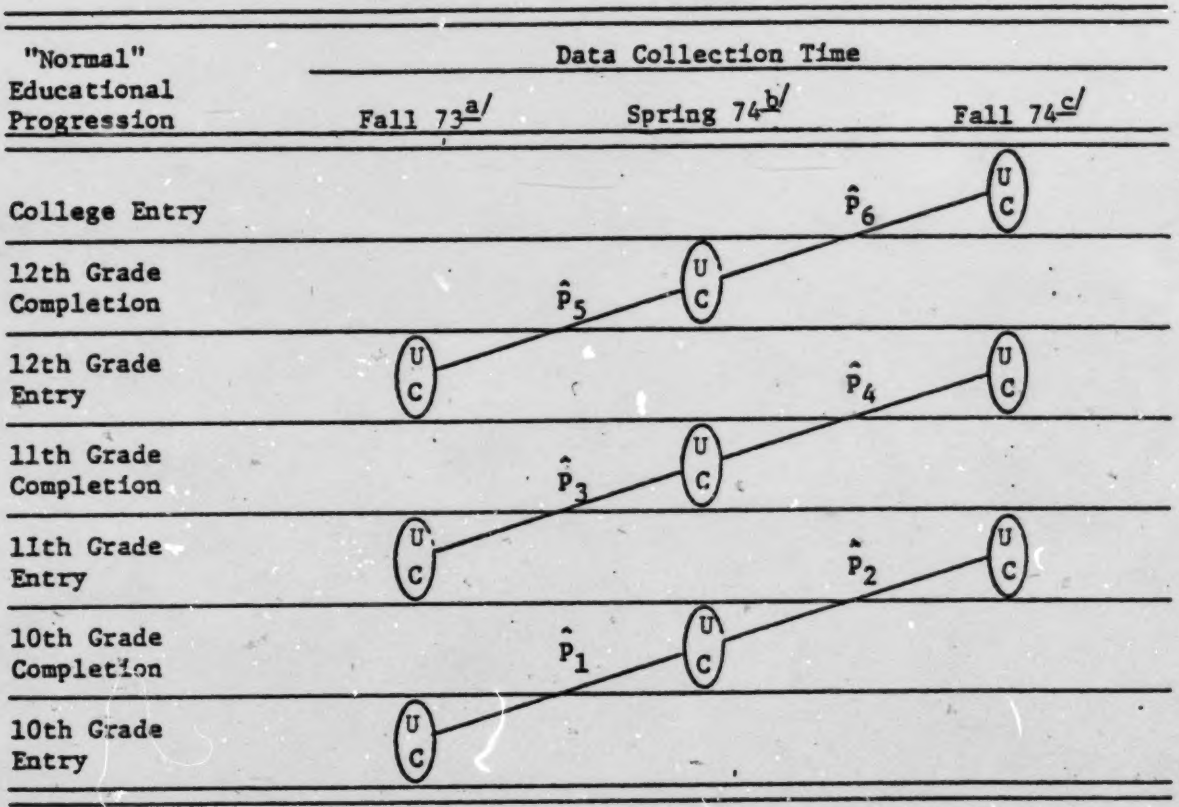
The "survivor" or selectivity effect can be examined within such a model. For example, a finding of no difference in the values of p_5 through p_8 between UB participants and non-participants would be considerably modified by a finding of considerably higher p_1 through p_4 values for UB participants. In other words, should the "survivor" effect be influencing any differential probabilities of entry into and completion of postsecondary education, this influence can be taken into consideration by showing that "survival" rates for UB participants from tenth to twelfth grade is substantially greater than for comparison students. More succinctly, high school graduation and subsequent education are dependent on having obtained the twelfth grade level.

In the present study, given a population of current UB participants and comparison cohorts, and an available period of data collection of April through December 1974, computation of some of the p_i values required retrospective data while computation of others required data collected over a short longitudinal span. Specifically, estimates of p_1, p_3, and p_5 were obtained from studying three groups of UB participants and three groups of non-participants who entered the tenth, eleventh, and twelfth grades respectively at the beginning of the 1973-74 academic year, with notation in spring 1974 of those remaining in school. Since the school year was nearly finished in the spring, if the students were still in school, it could be assumed they were likely to complete the school year. Confirmation of completion was obtained in the next point in data collection (fall 1974, when the same students were again contacted to determine whether or not they had progressed into the next grade or into postsecondary education). These additional data were necessary for estimating p_2, p_4, and p_6. The values of p_7 and p_8 of Table 1 could not be estimated within the current study design. The specific cohorts from which each of the estimated values of p_i were to be obtained and the times of data collection are summarized in Table 2.

11/ Although the transition matrix begins by assuming tenth grade entry, it is considered adequate for purposes of this study since almost all UB intervention comes at or after such a point in time.

Table 2

STUDENT COHORTS, POINTS OF DATA COLLECTION, AND ESTIMATES OF PROPORTIONS CONTINUING EDUCATION



Note: The letter "U" represents Upward Bound Participants, and "C", non-participants (comparison students).

a/ Data Obtained Retrospectively (Records show students to have been in school in Fall 1973).

b/ First Data Collection period.

c/ Second Data Collection period (follow up).